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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/830,752	04/30/2001	Hiroshi Furukawa	P/1929-79	1996

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EXAMINER	
MOORE JR, MICHAEL J	
ART UNIT	PAPER NUMBER
2616	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/31/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	09/830,752	FURUKAWA, HIROSHI	
	Examiner	Art Unit	
	Michael J. Moore, Jr.	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 September 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims **1-10** have been considered but are moot in view of the new ground(s) of rejection provided below. Therefore, the finality of the previous Office Action has been withdrawn.

Drawings

2. Replacement drawings were received on 9/12/2005 inserting a "Prior Art" label in Figures 5-7. After further review, Figure 4 is objected to because of the following minor informalities:

The word "equalizing" is spelled incorrectly in element 304 of Figure 4.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency.

Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The abstract of the disclosure is objected to because of the following: On line 16, the word "is" before "inverse" should be "are". Correction is required. See MPEP § 608.01(b).

4. The disclosure is objected to because of the following informalities: On page 1, line 11, the word "which" after "sequences" is not needed. On page 3, line 27, "detection unit 106" is needed after "code timing". On page 6, line 1, "output" is misspelled. On page 8, line 15, the word "raps" should be "taps". Lastly, on page 10, line 1, the word "disappear" should be "disappears". Appropriate correction is required.

Claim Objections

5. Claims **2-4, 6, and 8** are objected to because of the following informalities:

Regarding claim **2**, on line 4, the word "prescribes" should be "prescribed".

Regarding claim **3**, on line 7, the word "and" is needed after the word "equalizing". Also, on line 8, the word "is" after the word "characteristics" should be "are".

Regarding claim **4**, on line 7, the word "changes" should be "change".

Regarding claim **6**, on line 26, the phrase "is selected" after the word "quality" is not needed.

Regarding claim **8**, on line 15, the word "based" should be "base".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims **1, 2, 5, and 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Brajal et al. (U.S. 5,796,814) (hereinafter "Brajal") in view of Visotsky et al. (U.S. 6,175,588) (hereinafter "Visotsky").

Regarding claim **1**, *Brajal* teaches a receiver in Figure 1B (receiving apparatus), where a transmitter of Figure 1A (base station) modulates signals intended for the receiver as spoken of on column 4, lines 1-31.

Brajal also teaches an equalizer means TEQ 64 (equalization filter) in Figure 3 for correcting imperfections caused by the channel (eliminating channel distortion) as spoken of on column 5, lines 38-40.

Brajal also teaches computing means COMPUT 30 (transmission estimation unit) of Figure 3 that computes and updates the weight factors of the equalizer, so that its transfer function (frequency characteristics) is the inverse of the transfer function of the channel (estimation result) as spoken of on column 5, lines 42-47, as well as column 2, lines 13-18.

Brajal does not explicitly teach the equalization of spread spectrum signals based on the frequency response of a plurality of radio channels in a CDMA environment.

However, *Visotsky* teaches the use of adaptive equalization in a CDMA spread spectrum system as shown in Figure 1 and spoken of on column 3, lines 17-47.

At the time of the invention, it would have been obvious to someone of ordinary skill in the art, given these references, to combine the CDMA spread spectrum equalization teachings of *Visotsky* to the system of *Brajal* in order to provide interference suppression in a CDMA spread spectrum environment as spoken of on column 18, lines 38-45 of *Visotsky*.

Regarding claim **2**, *Brajal* further teaches an equalizer in Figure 9 containing a plurality of shift cells 80 (delay circuits) connected in series, a plurality of multipliers 81 that each have a weight factor input h", and an summator 85 (adder) that sums the outputs of the multipliers 81 as spoken of on column 7, lines 57-65.

Regarding claim **5**, *Brajal* teaches a receiver in Figure 1B, where a transmitter of Figure 1A (base station) modulates signals intended for the receiver as spoken of on column 4, lines 1-31.

Brajal also teaches a demodulation means 24 (having antenna) for extracting the digital baseband data representing the received coded symbols as spoken of on column 4, lines 29-31.

Brajal also teaches computing means COMPUT 30 of Figure 3 that computes and updates the weight factors of the equalizer (equalization filter), so that its transfer function (frequency characteristics) is the inverse of the transfer function of the channel (frequency characteristics of radio channel) as spoken of on column 5, lines 42-47, as well as column 2, lines 13-18.

Brajal also teaches a deframer 65, deserializer 66, FFT 62, and serializer 60 within demodulation means 24 used for demodulation of the output from equalizer TEQ 64 as shown in Figure 3 and spoken of on column 5, lines 17-37.

Brajal does not explicitly teach the equalization of spread spectrum signals based on the frequency response of a plurality of radio channels in a CDMA environment.

However, *Visotsky* teaches the use of adaptive equalization in a CDMA spread spectrum system as shown in Figure 1 and spoken of on column 3, lines 17-47.

At the time of the invention, it would have been obvious to someone of ordinary skill in the art, given these references, to combine the CDMA spread spectrum equalization teachings of *Visotsky* to the system of *Brajal* in order to provide interference suppression in a CDMA spread spectrum environment as spoken of on column 18, lines 38-45 of *Visotsky*.

Regarding claim **7**, *Brajal* teaches a receiver in Figure 1B (mobile station), where a transmitter of Figure 1A (base station) modulates signals intended for the receiver as spoken of on column 4, lines 1-31.

Brajal also teaches a demodulation means 24 (frequency conversion unit having antenna) for extracting the digital baseband data representing the received coded symbols as spoken of on column 4, lines 29-31.

Brajal also teaches computing means COMPUT 30 (channel estimation unit) of Figure 3 that computes and updates the weight factors (tap coefficients) of the equalizer (equalization filter unit), so that its transfer function (frequency characteristics) is the

inverse of the transfer function of the channel (frequency characteristics of channel) as spoken of on column 5, lines 42-47, as well as column 2, lines 13-18.

Brajal also teaches a deframer 65, deserializer 66, FFT 62, and serializer 60 within demodulation means 24 (demodulation unit) used for demodulation of the output from equalizer TEQ 64 as shown in Figure 3 and spoken of on column 5, lines 17-37.

Brajal does not explicitly teach the equalization of signals in a CDMA environment.

However, *Visotsky* teaches the use of adaptive equalization in a CDMA spread spectrum system as shown in Figure 1 and spoken of on column 3, lines 17-47.

At the time of the invention, it would have been obvious to someone of ordinary skill in the art, given these references, to combine the CDMA spread spectrum equalization teachings of *Visotsky* to the system of *Brajal* in order to provide interference suppression in a CDMA spread spectrum environment as spoken of on column 18, lines 38-45 of *Visotsky*.

8. Claims **3, 4, 6, and 8-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Brajal et al. (U.S. 5,796,814) (hereinafter "Brajal") in view of Applicant's Admitted Prior Art (hereinafter "APAA") and in further view of Bottomley et al. (U.S. 5,909,465) (hereinafter "Bottomley").

Regarding claim **3**, *Brajal* teaches a receiver in Figure 1B (mobile station), where a transmitter of Figure 1A (base station) modulates signals intended for the receiver as spoken of on column 4, lines 1-31.

Brajal also teaches computing means COMPUT 30 of Figure 3 that computes and updates the weight factors of the equalizer (filter), so that its transfer function (frequency characteristics) is the inverse of the transfer function of the channel (frequency characteristics of channel) as spoken of on column 5, lines 42-47, as well as column 2, lines 13-18.

Brajal also teaches a deframer 65, deserializer 66, FFT 62, and serializer 60 within demodulation means 24 used for demodulation of the output (generate equalized, demodulated output) from equalizer TEQ 64 as shown in Figure 3 and spoken of on column 5, lines 17-37.

Brajal does not teach demodulating independently each of the modulated signals and combining the demodulation results, thereby generating a conventional output.

However, *APAA* teaches a conventional RAKE receiver for a CDMA system in Figure 5 where a plurality of signal components (modulated signals) are demodulated independently via demodulation units 107 and then combined via combining unit 110 to arrive at received data (conventional output) as spoken of on page 2, line 16 – page 3, line 6 of Applicant's specification.

At the time of the invention, it would have been obvious to someone of ordinary skill in the art, given these references, to combine the RAKE receiver teachings of *APAA* with the equalization teachings of *Brajal* in order to provide improved signal equalization in a CDMA environment.

Brajal in view of APAA does not teach the selecting of an output with higher communication quality from the equalized, demodulated output and the conventional output.

However, *Bottomley* teaches a method of bidirectional demodulation where a type of demodulation is selected based upon a higher demodulation quality value as spoken of on column 5, lines 37-61.

At the time of the invention, it would have been obvious to someone of ordinary skill in the art, given these references, to combine the demodulation quality selection teachings of *Bottomley* with the equalization and demodulation teachings of *Brajal in view of APAA* in order to provide an equalization and demodulation scheme providing enhanced output quality as spoken of on column 5, lines 23-29 of *Bottomley*.

Regarding claim **4**, *Brajal* further teaches an equalizer in Figure 9 containing a plurality of shift cells 80 (delay circuits) connected in series, a plurality of multipliers 81 that each have a weight factor (coefficient) input h", and an summator 85 (adder) that sums (adds) the outputs of the multipliers 81 as spoken of on column 7, lines 57-65.

Regarding claim **6**, *Brajal* teaches a receiver in Figure 1B (receiving apparatus), where a transmitter of Figure 1A (base station) modulates signals intended for the receiver as spoken of on column 4, lines 1-31.

Brajal also teaches a demodulation means 24 (first receiving unit, frequency conversion unit having antenna) for extracting the digital baseband data representing the received coded symbols as spoken of on column 4, lines 29-31.

Brajal also teaches computing means COMPUT 30 (channel estimation unit) of Figure 3 that computes and updates the weight factors of the equalizer (filter unit), so that its transfer function (frequency characteristics) is the inverse of the transfer function of the channel (frequency characteristics of channel) as spoken of on column 5, lines 42-47, as well as column 2, lines 13-18.

Brajal also teaches a deframer 65, deserializer 66, FFT 62, and serializer 60 within demodulation means 24 (demodulator) used for demodulation of the output from equalizer TEQ 64 as shown in Figure 3 and spoken of on column 5, lines 17-37.

Brajal does not teach a second receiving unit comprising a demodulation unit that demodulates independently each of the modulated signals and combines the demodulation results.

However, *APAA* teaches a conventional RAKE receiver for a CDMA system in Figure 5 where a plurality of signal components (modulated signals) are demodulated independently via demodulation units 107 and then combined via combining unit 110 to arrive at received data as spoken of on page 2, line 16 – page 3, line 6 of Applicant's specification.

At the time of the invention, it would have been obvious to someone of ordinary skill in the art, given these references, to combine the RAKE receiver teachings of *APAA* with the equalization teachings of *Brajal* in order to provide improved signal equalization in a CDMA environment.

Brajal in view of APAA does not teach a selection unit for selecting an output with higher communication quality from the outputs of the first and second receiving units.

However, *Bottomley* teaches a method of bidirectional demodulation where a type of demodulation is selected based upon a higher demodulation quality value as spoken of on column 5, lines 37-61.

At the time of the invention, it would have been obvious to someone of ordinary skill in the art, given these references, to combine the demodulation quality selection teachings of *Bottomley* with the equalization and demodulation teachings of *Brajal in view of APAA* in order to provide an equalization and demodulation scheme providing enhanced output quality as spoken of on column 5, lines 23-29 of *Bottomley.*

Regarding claim **8**, *Brajal* teaches a receiver in Figure 1B (mobile station), where a transmitter of Figure 1A (base station) modulates signals intended for the receiver as spoken of on column 4, lines 1-31.

Brajal also teaches a demodulation means 24 (first receiving unit, frequency conversion unit having antenna) for extracting the digital baseband data representing the received coded symbols as spoken of on column 4, lines 29-31.

Brajal also teaches computing means COMPUT 30 (channel estimation unit) of Figure 3 that computes and updates the weight factors of the equalizer (filter unit), so that its transfer function (frequency characteristics) is the inverse of the transfer function of the channel (frequency characteristics of channel) as spoken of on column 5, lines 42-47, as well as column 2, lines 13-18.

Brajal also teaches a deframer 65, deserializer 66, FFT 62, and serializer 60 within demodulation means 24 (demodulator) used for demodulation of the output from equalizer TEQ 64 as shown in Figure 3 and spoken of on column 5, lines 17-37.

Brajal does not teach a second receiving unit comprising a demodulation unit that demodulates independently each of the modulated signals and combines the demodulation results.

However, *APAA* teaches a conventional RAKE receiver for a CDMA system in Figure 5 where a plurality of signal components (modulated signals) are demodulated independently via demodulation units 107 and then combined via combining unit 110 to arrive at received data as spoken of on page 2, line 16 – page 3, line 6 of Applicant's specification.

At the time of the invention, it would have been obvious to someone of ordinary skill in the art, given these references, to combine the RAKE receiver teachings of *APAA* with the equalization teachings of *Brajal* in order to provide improved signal equalization in a CDMA environment.

Brajal in view of APAA does not teach a selection unit for selecting an output with higher communication quality from the outputs of the first and second receiving units.

However, *Bottomley* teaches a method of bidirectional demodulation where a type of demodulation is selected based upon a higher demodulation quality value as spoken of on column 5, lines 37-61.

At the time of the invention, it would have been obvious to someone of ordinary skill in the art, given these references, to combine the demodulation quality selection teachings of *Bottomley* with the equalization and demodulation teachings of *Brajal in view of APAA* in order to provide an equalization and demodulation scheme providing enhanced output quality as spoken of on column 5, lines 23-29 of *Bottomley*.

Regarding claim **9**, *Brajal* further teaches the equalization of signals by equalizer TEQ 64 with demodulation means 24 before outputting to decoding means 20 as shown in Figures 1B and 3.

Regarding claim **10**, *Brajal* further teaches a deframer 65, deserializer 66, FFT 62, and serializer 60 within demodulation means 24 (demodulator) used for demodulation of the output from equalizer TEQ 64 as shown in Figure 3 and spoken of on column 5, lines 17-37.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bottomley et al. (U.S. 6,252,918), Lindoff (U.S. 6,373,888), Dent et al. (U.S. 5,572,552), and Arnstein (U.S. 6,047,023) are other references considered pertinent to this application.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Moore, Jr. whose telephone number is (571) 272-3168. The examiner can normally be reached on Monday-Friday (7:30am - 4:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema S. Rao can be reached at (571) 272-3174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael J. Moore, Jr.
Examiner
Art Unit 2616

mjm MM

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